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CLAIMS:

1. (cancelled).
2. (currently amended) A ceramic thermal barrier coating comprising:
a layer of MCrAlY bond coat disposed over a substrate, wherein M is iron, nickel, cobalt or a combination thereof;
a layer of thermally grown oxide disposed on the MCrAlY bond coat;
a layer of ceramic oxide insulating material disposed over the thermally grown oxide layer; and
wherein the a region of nano-sized features comprises comprising a mixed oxide layer formed of mixed oxide particles comprising zirconium and yttrium dispersed in an alumina matrix and having a size range of less than 100 nm disposed between the thermally grown oxide layer and the layer of ceramic oxide insulating material;
wherein a ratio of average thickness of the mixed oxide layer to average thickness of the thermally grown oxide layer is between 0.333 and 0.1667.
3. (previously presented) The ceramic thermal barrier coating of claim 2, wherein the size range is less than 50 nm.
4. (previously presented) The ceramic thermal barrier coating of claim 2, wherein the size range is between 10-100 nm.
5. (cancelled).

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6. (currently amended) A ceramic thermal barrier coating comprising a region of features having a size range of less than 200 nm, the ceramic thermal barrier coating further comprising:

a layer of MCrAlY bond coat disposed over a substrate, wherein M is iron, nickel, cobalt or a combination thereof;

a layer of thermally grown oxide disposed on the MCrAlY bond coat;

a layer of ceramic oxide insulating material disposed over the thermally grown oxide layer;

a mixed oxide layer comprising zirconium and yttrium dispersed in an alumina matrix and disposed between the layer of thermally grown oxide and the layer of ceramic oxide insulating material; and

wherein the region of nano-sized features comprises a plurality of alumina projections extending across the interface from the mixed oxide layer into the insulating material layer and having a cross-sectional lineal density of between 1 and 10 projections per 200 nm.

7. (previously presented) The ceramic thermal barrier coating of claim 6, wherein the projections comprise an aspect ratio of between 5 and 50.

8. (previously presented) A ceramic thermal barrier coating comprising a region of nano sized features having a size range of less than 200 nm, wherein the nano sized features comprise columnar grains having cross-sectional widths in the range of 1-5 nm formed within individual splats of a ceramic insulating material deposited by an air plasma spray process.

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9. (previously presented) A ceramic thermal barrier coating comprising a region of features having a size range of less than 200 nm, the ceramic thermal barrier coating further comprising:

primary columnar grains extending transversely relative to a substrate surface;
and

wherein the nano-sized features comprise secondary columnar grains extending laterally from the primary columnar grains and having lengths in the range of 5-80 nm.

10. (previously presented) The ceramic thermal barrier coating of claim 9, further comprising the secondary columnar grains having an as-deposited tip with a radius of curvature of less than 0.1 nm.

11. (previously presented) A ceramic thermal barrier material comprising a region of features maintaining a Specific Surface Area of at least $20,000 \text{ cm}^2/\text{cm}^3$ after exposure of the material to a temperature of $1,200^\circ\text{C}$ for 1,000 hours.

12. (cancelled).

13. (cancelled).